

What is claimed is:

1.

1 An apparatus for measuring constituents of harvested
2 agricultural products on a combine comprising:
3 a monochromator mounted to the combine, the monochromator
4 having no moving optical components;
5 a radiation source coupled to the combine and disposed near
6 the harvested products for irradiating the products;
7 a fiber optic cable connected to the monochromator for
8 transmitting radiation reflected off the agricultural
9 products to the monochromator; and
10 a data processor connected to the monochromator for
11 identifying and determining the amount of constituents
12 in the agricultural products.

2.

1 The apparatus of claim 1 wherein the monochromator
2 further comprises:
3 a dispersive element immovably coupled to the monochromator;
4 and
5 a photodiode array immovably coupled to the monochromator for
6 detecting radiation dispersed by the dispersive element.

3.

1 The apparatus of claim 2 wherein the dispersive element
2 is comprised of a diffraction grating.

4.

1 The apparatus of claim 1 further comprising a sensor
2 assembly coupled to the combine proximate the harvested
3 product~~s~~.

5.

1 The apparatus of claim 4, wherein the sensor assembly
2 further comprises:
3 a frame mounted to the combine, wherein the radiation source
4 is coupled to the frame, and wherein the fiber optic
5 cable is coupled to the frame in a position which allows
6 the fiber optic cable to receive reflected radiation
7 from the product~~s~~.

6.

1 The apparatus of claim 5 wherein the radiation source is
2 electrically connected to a power source on the combine by a
3 power line, wherein the power line and the fiber optic cable
4 are combined forming a cable assembly.

7.

1 The apparatus of claim 5 wherein the fiber optic cable
2 is further comprised of a plurality of fiber optic strands
3 having first and second ends, wherein the first ends of the
4 fiber optic strands form a radiation sensor.

8.

1 The apparatus of claim 7 wherein the plurality of fiber
2 optic strands are separated into a plurality of groups of
3 strands, forming a plurality of radiation sensors.

9.

1 The apparatus of claim 4 wherein the sensor assembly
2 includes a housing.

10.

1 The apparatus of claim 9 further comprising a reflective
2 calibration surface disposed within the housing, wherein the
3 reflective calibration surface is positioned where radiation
4 from the radiation source is incident on the reflective
5 calibration surface.

11.

1 The apparatus of claim 1 further comprising a data
2 storage device for storing data processed by the data
3 processor.

12.

1 A method of measuring constituents of harvested
2 agricultural products comprising the steps of:
3 providing a combine for harvesting a field of crops;
4 providing a monochromator coupled to the combine, the
5 monochromator including a photodiode array and a fixed
6 dispersive element;
7 providing a radiation source coupled to the combine near a
8 source of the agricultural product harvested by the
9 combine;

10 applying radiation to the product;
11 sensing radiation that is reflected off of the product; and
12 analyzing the sensed radiation to determine various
13 constituents of the agricultural product.

13.

1 A method of analyzing on a combine an agricultural
2 product harvested from a test plot comprising the steps of:
3 harvesting the agricultural product with a research combine;
4 collecting a sample of the product and containing the sample
5 in a chamber;
6 weighing the chamber to determine the weight of the sample;
7 sensing the moisture content of the sample in the chamber;
8 sensing the volume of the sample in the chamber; and
9 determining the identity and amount of constituents in the
10 sample, further comprising the steps of:
11 irradiating the sample with radiation,
12 sensing radiation which reflects off of the sample, and
13 analyzing the spectrum of the reflected radiation to
14 determine the identity and amount of constituents
15 in the sample.

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